

WHAT IS CLAIMED IS:

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b4
1. A method to induce homologous recombination in a plant, comprising introducing a recombination construct to the plant, and making available to the plant a transposase, so as to induce homologous recombination.

Sch A1
2. A method of claim 1, wherein the recombination construct comprises a maize Ds element and the transposase is of maize origin.

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3. A method of claim 2, wherein the recombination construct further comprises direct repeats proximal to the Ds element, and an agronomically significant gene internal to the direct repeats, wherein the agronomically significant gene is selected from the group consisting of: genes useful for disease resistance; genes useful for male sterility; genes useful for environmental condition tolerance; and genes useful for commercially-enhancing a biosynthetic pathway.

4. A method of claim 2, wherein the plant in which recombination is induced is selected from the group consisting of: soybean; maize; sugar cane; beet; tobacco; wheat; barley; poppy; rape; sunflower; alfalfa; sorghum; rose; carnation; gerbera; carrot; tomato; lettuce; chicory; pepper; melon; Arabidopsis; and cabbage.

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5. A method to construct a functional gene in plants, comprising introducing to the plant a maize recombination construct having overlapping sequences having homologous regions, which sequences, when homologously recombined, result in a functional gene, and making available to the plant a maize transposase, so as to induce recombination and construction of a functional gene.

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~~6.~~ A method of claim 5, wherein the functional gene is selected from the group consisting of: genes useful for disease resistance; genes useful for male sterility; genes useful for environmental condition tolerance; and genes useful for commercially-enhancing a biosynthetic pathway.

~~7.~~ A method of claim 5, wherein the plant in which recombination is induced is selected from the group consisting of: soybean; maize; sugar cane; beet; tobacco; wheat; barley; poppy; rape; sunflower; alfalfa; sorghum; rose; carnation; gerbera; carrot; tomato; lettuce; chicory; pepper; melon; *Arabidopsis*; and cabbage.

~~8.~~ A method to induce transcription and/or translation of a gene in a plant comprising introducing to the plant a maize Ds element containing overlapping sequences having homologous regions, which sequences, when homologously recombined, result in a gene; and subsequently making available to the plant the transposase, so as to induce homologous recombination and subsequent transcription and translation of said gene.

~~9.~~ A method of claim 8, wherein the gene is selected from the group consisting of those genes useful for: genes useful for disease resistance; genes useful for male sterility; genes useful for environmental condition tolerance; and genes useful for commercially-enhancing a biosynthetic pathway.

~~10.~~ A method of claim 9, wherein the plant in which recombination is induced is selected from the group consisting of: soybean; maize; sugar cane; beet; tobacco; wheat; barley; poppy; rape; sunflower; alfalfa;

sorghum; rose; carnation; gerbera; carrot; tomato; lettuce; chicory; pepper; melon; *Arabidopsis*; and cabbage.

11. A method to alter a naturally-occurring sequence in plants, comprising introducing to the plant a maize recombination construct having direct repeats useful for subsequent removal of the recombination construct via homologous recombination.

12. A method of claim 11, wherein the plant in which the naturally-occurring sequence is disrupted is selected from the group consisting of: soybean; maize; sugar cane; beet; tobacco; wheat; barley; poppy; rape; sunflower; alfalfa; sorghum; rose; carnation; gerbera; carrot; tomato; lettuce; chicory; pepper; melon; *Arabidopsis*; and cabbage.

13. A method to construct a fusion protein sequence in plants, comprising introducing to the plant a maize recombination construct having overlapping sequences having homologous regions, which sequences, when homologously recombined, result in a fusion protein sequence, and making available to the plant a maize transposase, so as to cause recombination and construction of a fusion protein sequence.

14. A method of claim 2, wherein the fusion protein sequence is selected from the group consisting of: genes useful for disease resistance; genes useful for male sterility; genes useful for environmental condition tolerance; and genes useful for commercially-enhancing a biosynthetic pathway.

15. A method of claim 13, wherein the plant in which a fusion protein is constructed is selected from the group consisting of: soybean; maize; sugar cane; beet;

tobacco; wheat; barley; poppy; rape; sunflower; alfalfa; sorghum; rose; carnation; gerbera; carrot; tomato; lettuce; chicory; pepper; melon; Arabidopsis; and cabbage.

16. A method to induce complementary nucleic acid sequence production in plants, comprising introducing to the plant a maize recombination construct having overlapping sequences having homologous regions, which sequences, when homologously recombined, result in complementary nucleic acid sequences, and making available to the plant a maize transposase, so as to cause recombination and production of said complementary nucleic acid sequences.

17. A method of claim 16, wherein the plant in which recombination and production of complementary nucleic acid sequences is induced is selected from the group consisting of: soybean; maize; sugar cane; beet; tobacco; wheat; barley; poppy; rape; sunflower; alfalfa; sorghum; rose; carnation; gerbera; carrot; tomato; lettuce; chicory; pepper; melon; Arabidopsis; and cabbage.

18. A composition of matter which can be induced to undergo homologous recombination upon introduction of a maize transposase comprising a maize recombination construct having proximal direct repeat sequences.

19) A composition of matter which can be induced to undergo homologous recombination upon introduction of a maize transposase comprising a maize recombination construct of claim 18 as part of a vector.

20. A composition of matter which can be induced to undergo homologous recombination upon introduction of a

~~maize transposase comprising a maize recombination construct of claim 18 in a plant.~~

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~~21. A composition of matter of claim 20, which further comprises a transposase gene under control of an inducible promoter.~~

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~~22. A composition of matter of claim 20, which further comprises a gene internal to said direct repeat sequences.~~

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~~23. A composition of matter of claim 20, wherein said direct repeat sequences are in the form of overlapping sequences having homologous regions.~~